SAGE III (Stratospheric Aerosol and Gas Experiment) Project Guide Document

Summary:

The SAGE III instrument utilizes the self-calibrating solar occultation technique to measure profiles of aerosols, clouds, ozone (O_3), nitrogen dioxide (NO_2), and water vapor (H_2O), identified as critical in the U.S. National Plan for Stratospheric Monitoring, and utilizes lunar occultation observations to monitor the key nighttime species nitrogen trioxide (NO3) and chlorine dioxide (OClO).

SAGE III is a natural and improved extension of the very successful SAM II, SAGE I, and SAGE II experiments. The solar occultation (SOC), or Earth-limb extinction technique employed by these experiments is inherently a well-posed, well-behaved inversion problem, is self-calibrating, and has demonstrated high vertical resolution and high signal-to-noise and, therefore, possesses excellent accuracy.

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1. Project Overview:

Name of Project:

SAGE III (Stratospheric Aerosol and Gas Experiment)

Project Introduction:

Since the 1950's, it has become increasingly clear that human activities are modifying the composition of the atmosphere on a global scale. As the result of industrialization, the concentration of carbon dioxide has increased by about 20 0uring this period.

More recently, the stratospheric concentrations of chemically-active gases containing chlorine, bromine, and fluorine have dramatically increased (see the World Climate Research Program). These trends have created issues of global interest including global warming and declining levels of ozone (both globally and in the ozone "hole" in the Antarctic).It has become increasingly clear, however, that these processes do not occur independently of one another and can only be understood in the context of a global system.

As a result, in 1991 NASA initiated a comprehensive program to understand the Earth's atmosphere, oceans, land, and cryosphere (ice and snow) as a single, complex, interactive system. NASA's Earth Observing System (EOS) consists of a series of spaceborne instruments to monitor crucial components of the Earth system, an advanced data handling system, and teams of scientists who will evaluate on-going climate change and predict future changes. Ultimately, EOS will produce scientifically sound recommendations for environmental policy to national and international bodies to mitigate or prepare for these changes.

SAGE III's role in the EOS program is to provide global, long-term measurements of key components of the Earth's atmosphere. The most important of these are the vertical distribution of aerosols and ozone from the upper troposphere through the stratosphere. In addition, SAGE III also provides unique measurements of temperature in the stratosphere and mesosphere and profiles of trace gases such as water vapor and nitrogen dioxide that play significant roles in atmospheric radiative and chemical processes. The SAGE III Science Team functions in a dual role where they ensure the data quality and interpret the SAGE III data in the broader context of global change.

Project Mission Objectives:

The specific measurement objectives of SAGE III are to provide 1 km vertical resolution profiles of: aerosols and clouds at seven wavelengths from the mid-troposphere into the stratosphere and where appropriate, the mesosphere; O_3 from the mid-troposphere to 85 km; H_2O from the planetary boundary layer to 50 km; NO_2 from the tropopause to 45 km; NO_3 from 20 to 55 km; OClO from 15 to 25 km; and, O_2 from the mid-troposphere to 70 km. These measurements provide important data that address the major objectives of EOS including the impact of these species on global climate change.

Discipline(s):

Earth Sciences
Atmospheric Sciences

Geographic Region(s):

The Russian Space Agency's Meteor-3M is in a sun synchronous orbit that yields solar measurement opportunities between 50 and 80 degrees North and 30 and 50 degrees South. The high northern latitude coverage provides insight into the processes leading to ozone depletion during boreal winter and provide coverage that complements the mid and low latitude coverage provided by SAGE II and other SAGE III missions.

Detailed Project Description:

2. Data Availability:

Data Type(s):

This data is in HDF (Hierarchical Data Format).

Input/Output Media:

Data is available to the user via FTP (see Data Access section below).

Proprietary Status:

There is no proprietary status for the data sets currently on-line at the Langley DAAC.

3. Data Access:

The SAGE III data is accessible by contacting the ASDC User Services, through the Data Pool, and through the Reverb Search Tool.

Data Center Location:

Langley DAAC User and Data Services Office
NASA Langley Research Center

Contact Information:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
Hampton, Virginia 23681-2199
USA
Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov

Associated Costs:

Currently, there is no cost associated with this data.

4. Principal Investigator Information:

Investigator(s) Name and Title:

Dr. M. Patrick McCormick
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NASA Langley Research Center

Dr. William P. Chu
Project Scientist
NASA Langley Research Center

5. Submitting Investigator Information:

Investigator(s) Name and Title:

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6. References:

7. Acknowledgements:

The requested form of acknowledgment for any publication in which this data are used is:

"These data were obtained from the NASA Langley Research Center EOSDIS Distributed Active Archive Center."

The Langley DAAC requests two reprints of any published papers or reports which cite the use of data that the Langley DAAC have distributed. This will help the DAAC to determine the use of data distributed, which is helpful in optimizing product development. It also helps the DAAC to keep our product related references current.

8. Glossary and Acronyms:

EOSDIS Acronyms (PDF).

9. Document Information:

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